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Nicoletti

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(54) **PACKAGE STRUCTURE FOR GLASS CONTAINERS FOR PHARMACEUTICAL USE**

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Related U.S. Application Data

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(30) **Foreign Application Priority Data**

Aug. 2, 2007 (CH) 1232/07

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B65D 1/34 (2006.01)

(52) **U.S. Cl.**
USPC **206/560**; 206/486; 206/562

(58) **Field of Classification Search**
USPC 206/443, 480, 486, 488, 490, 499, 557, 206/560, 562, 563, 565; 211/74, 85.18, 211/85.29; 248/309.1, 311.2, 311.3, 314
See application file for complete search history.

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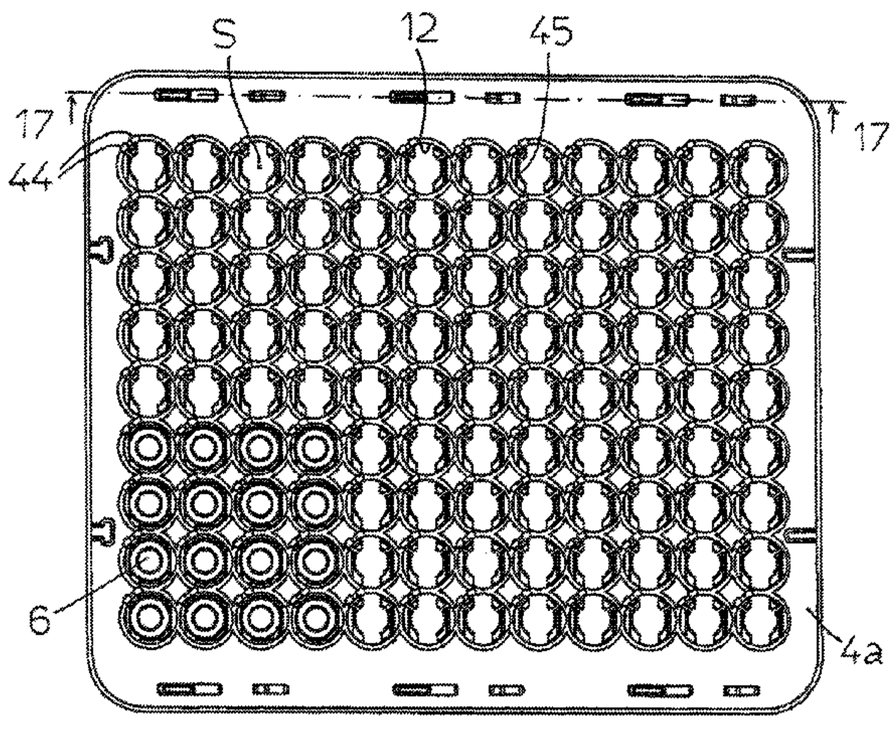
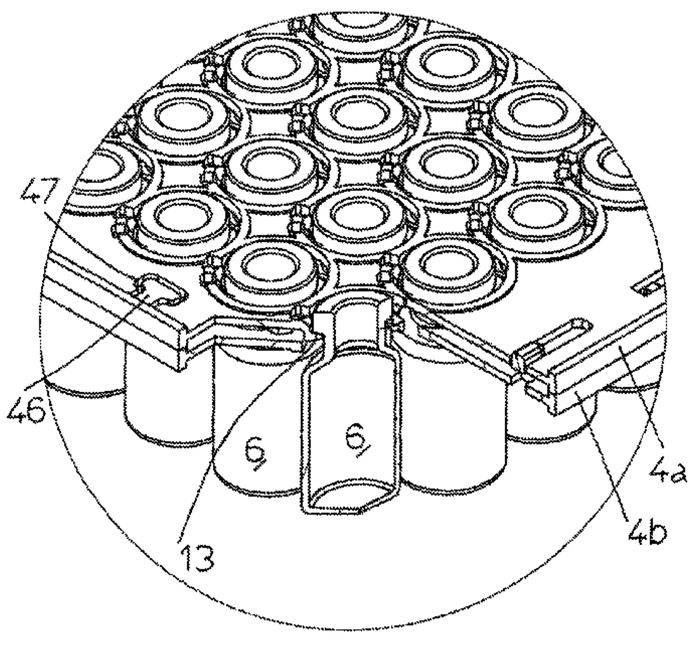
(57) **ABSTRACT**

The package structure for glass containers for pharmaceutical use (e.g.: bottles, carpules and phials . . .), comprises a tray (**2**) accommodating, at a raised position with respect to its bottom, a support plane (**4**) having a plurality of holes (**12**) for introducing containers spaced with a preset spatial order, the support plane comprising, at each introduction hole, elastically yielding means (**13**) for holding the container by means of a radial holding force, the holding means extending inside the volume enclosed by the projection of the perimeter of the hole in a manner parallel to the central symmetry axis (S) of the latter.

4 Claims, 7 Drawing Sheets





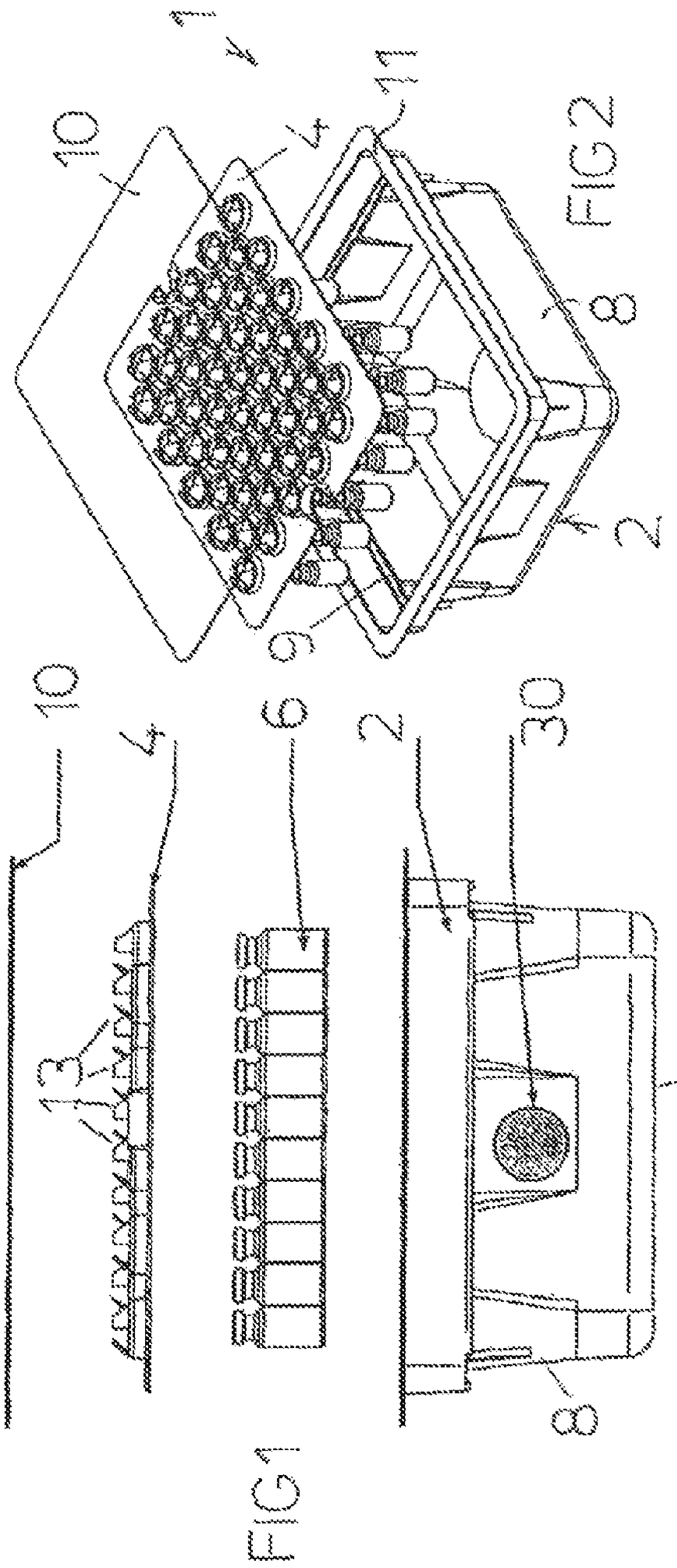


FIG 1

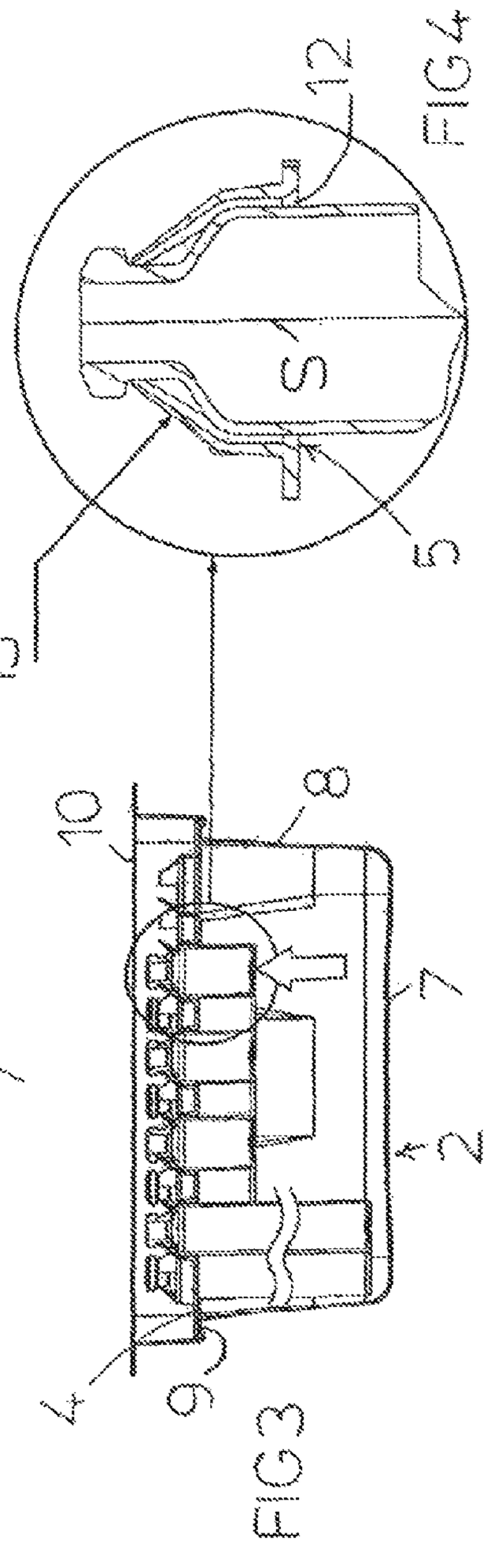


FIG 3

FIG 2

FIG 4

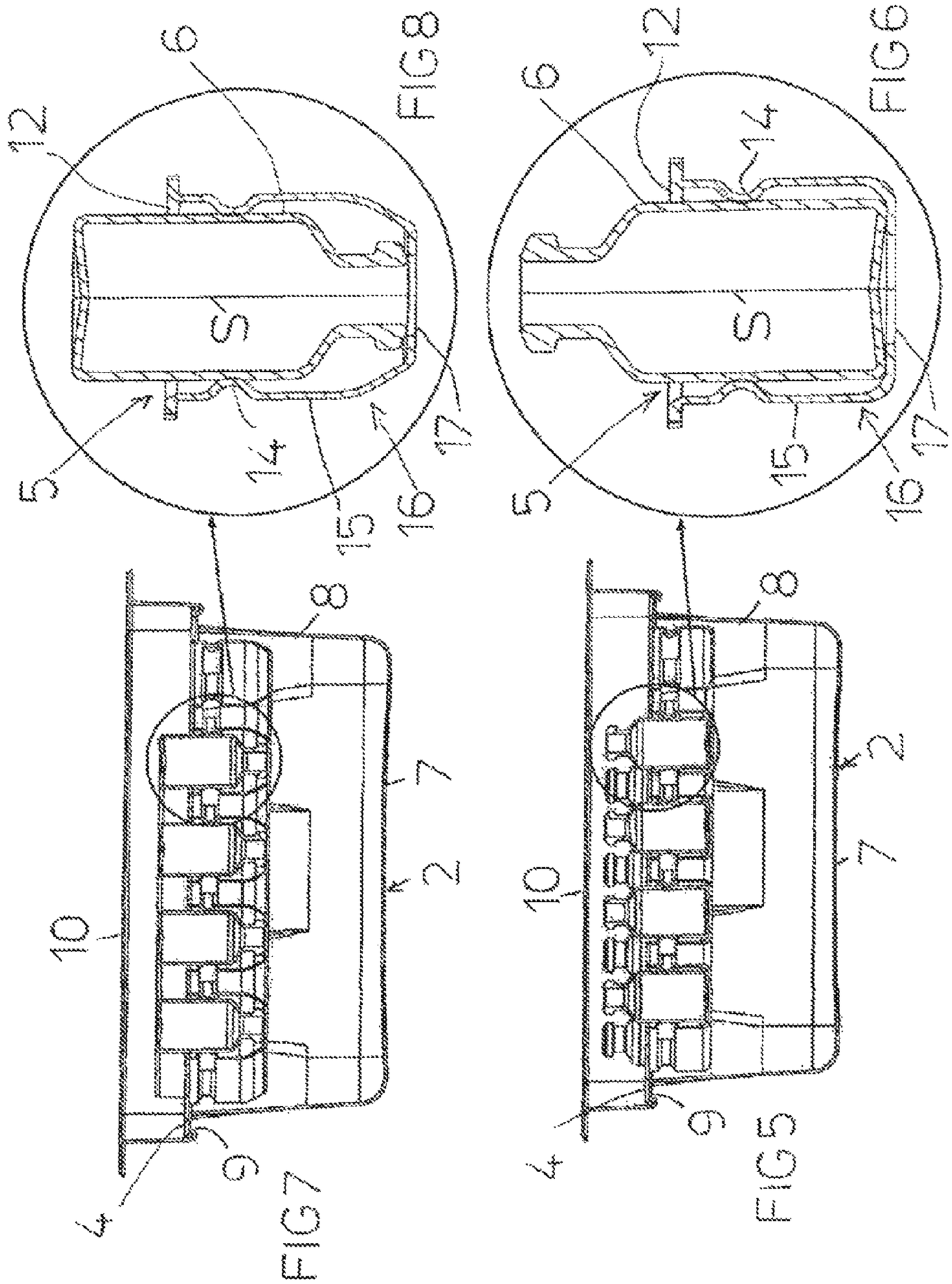


FIG 5

FIG 6

FIG 7

FIG 8

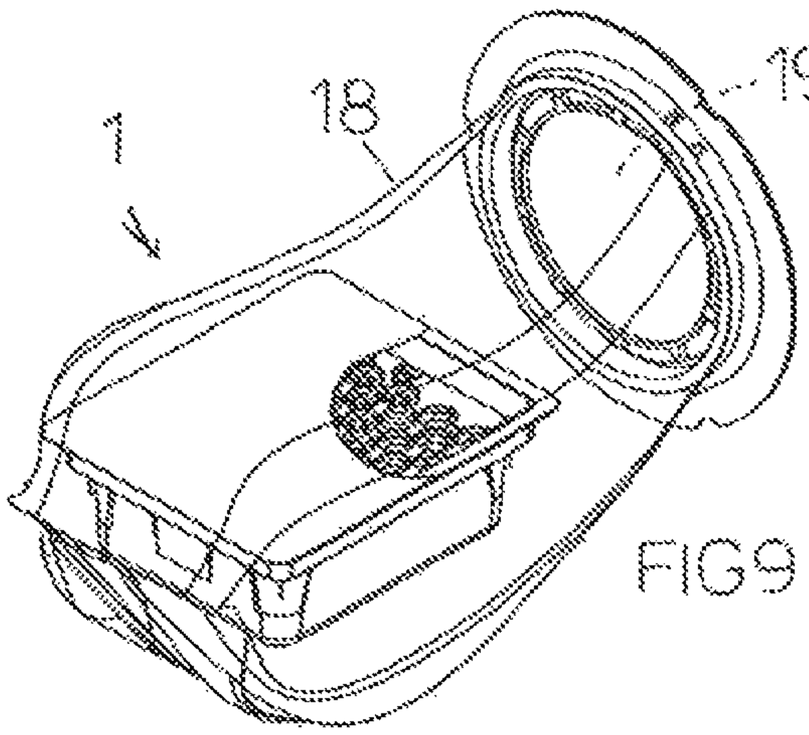


FIG 9

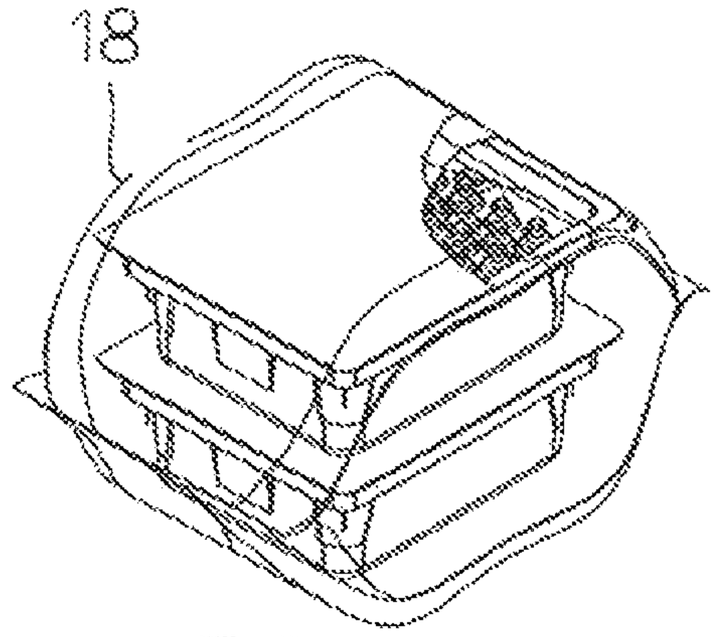


FIG 10

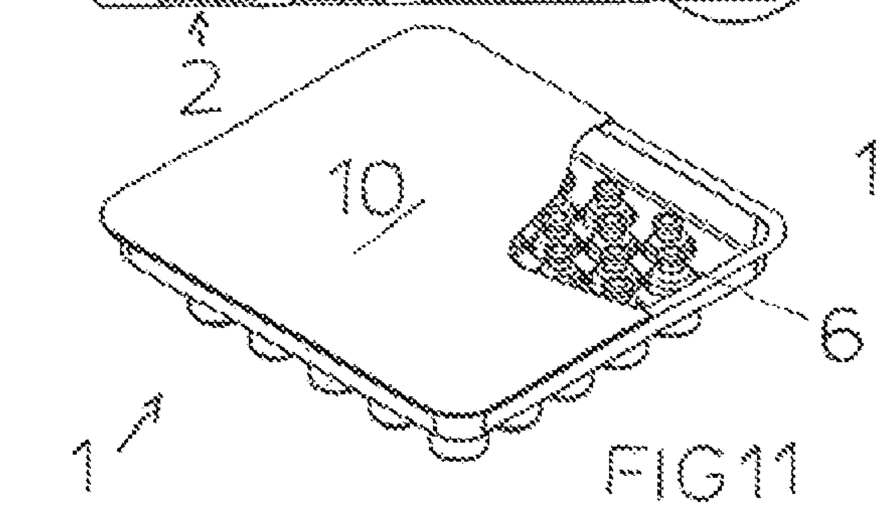


FIG 11

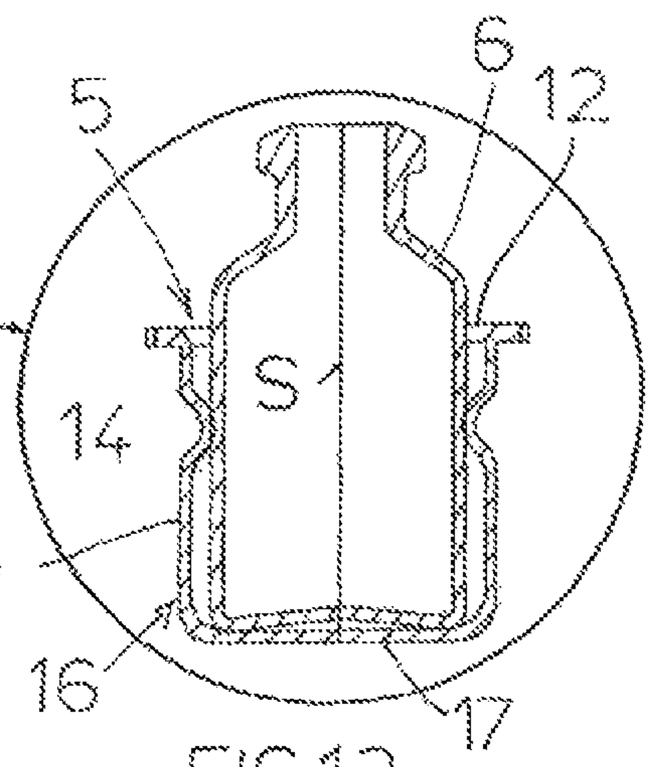


FIG 13

FIG 12

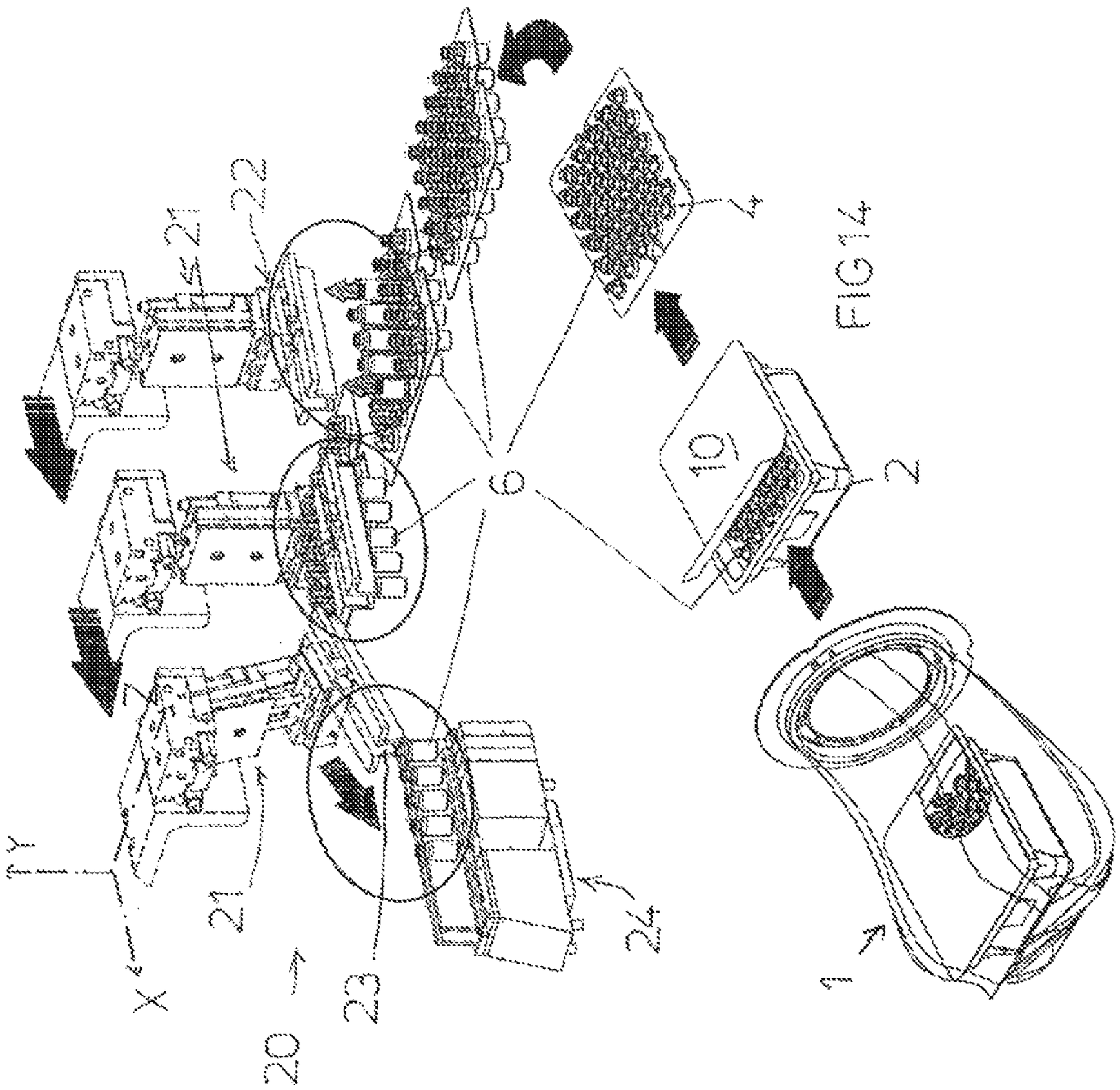


FIG 14
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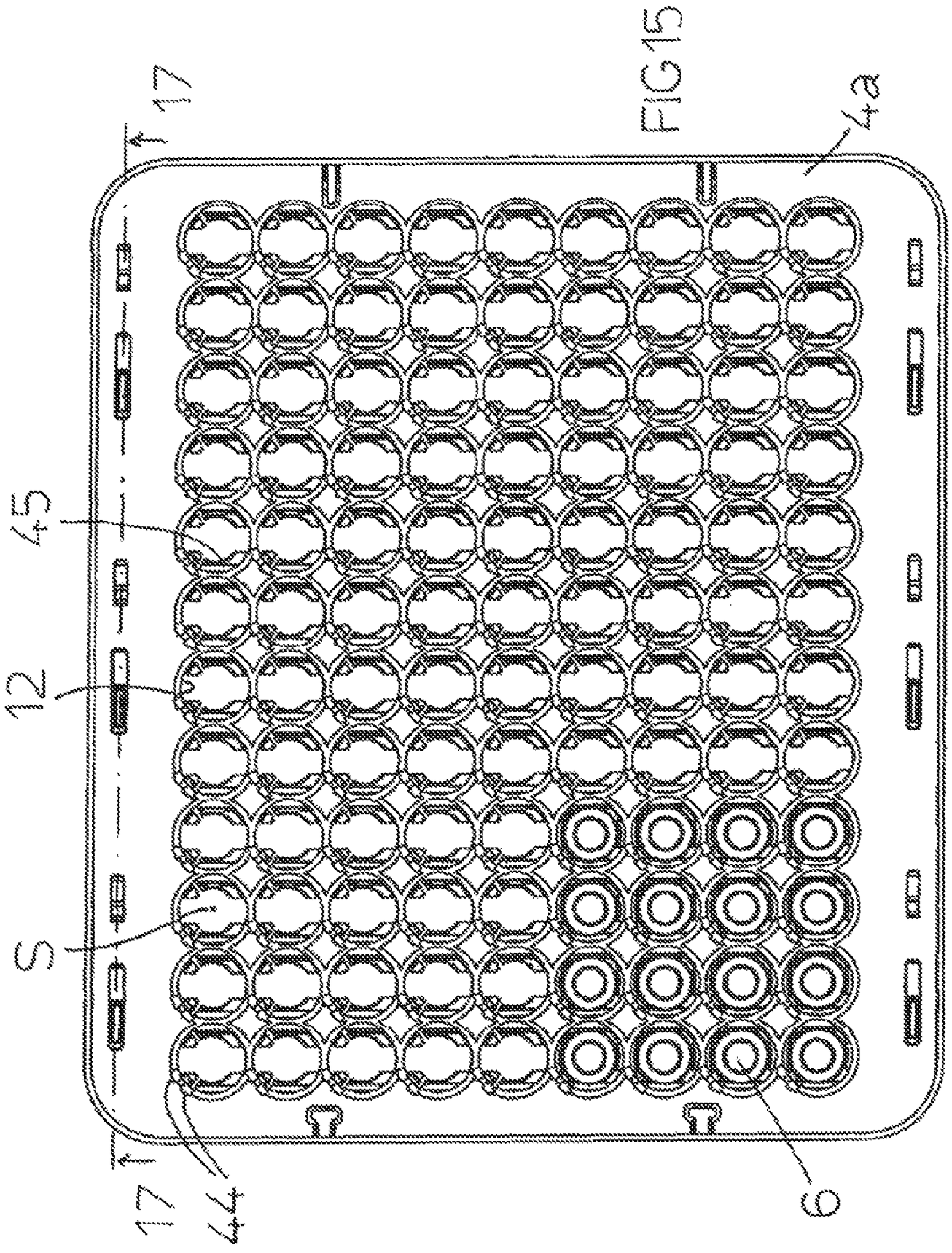
24
25
26
27
X
Y
Z

FIG 15



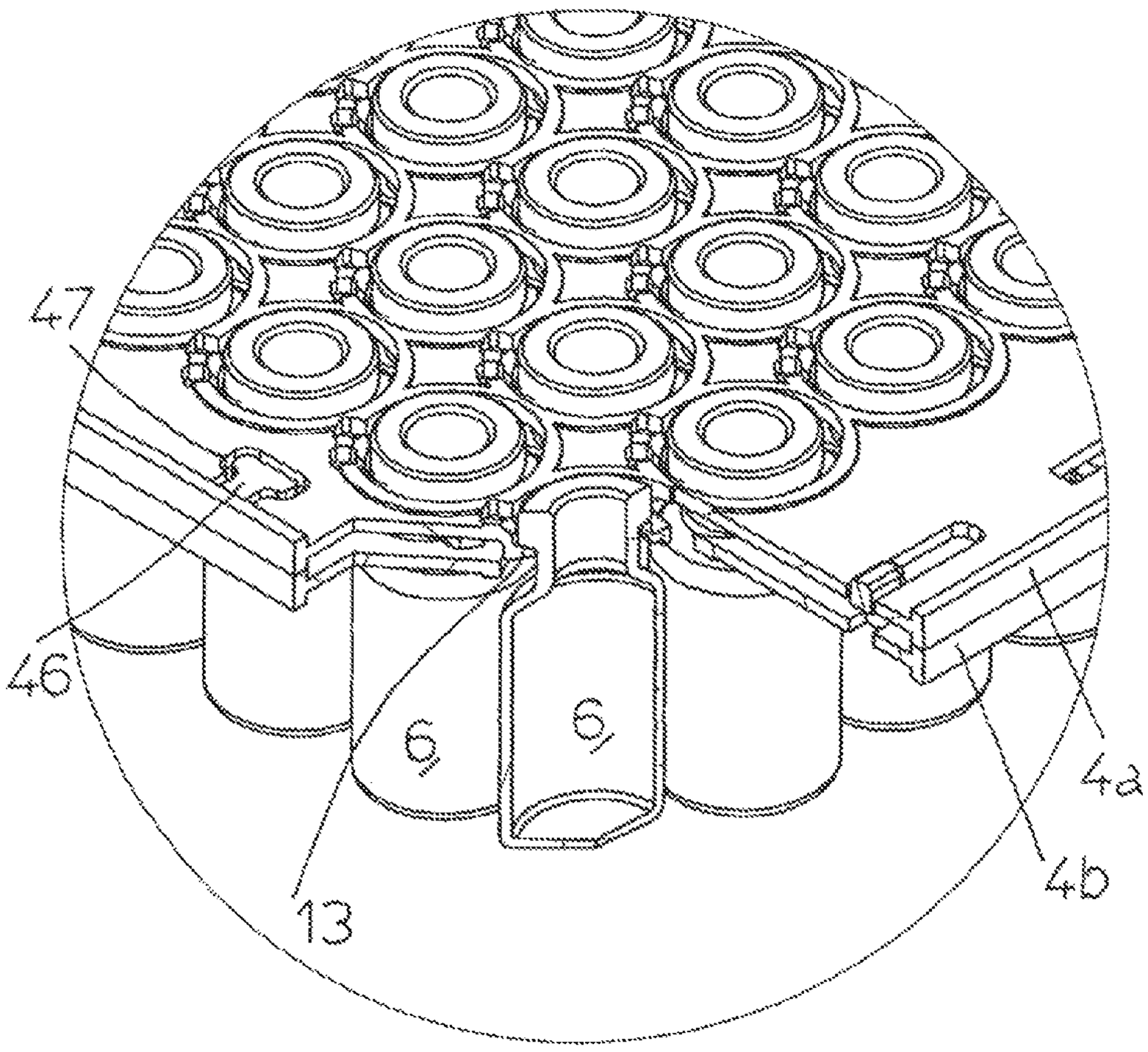


FIG 16

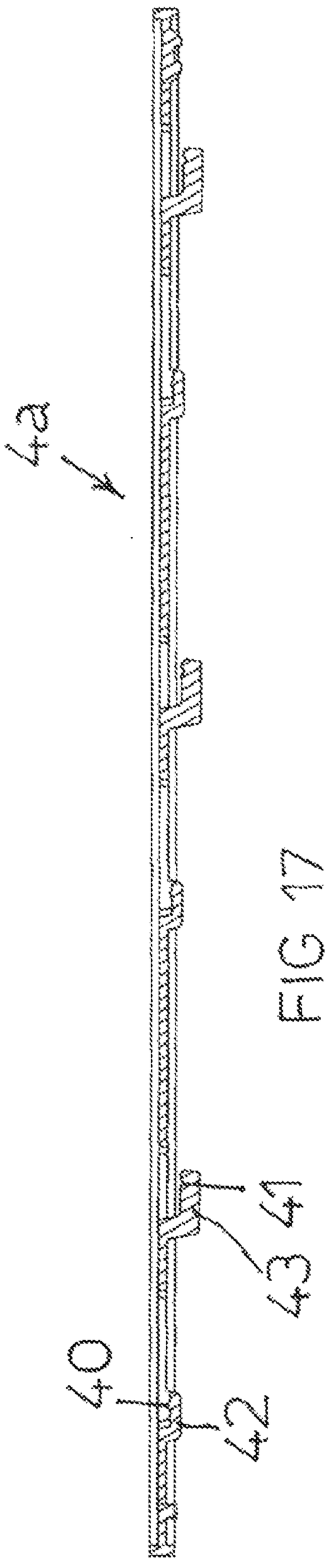


FIG 17

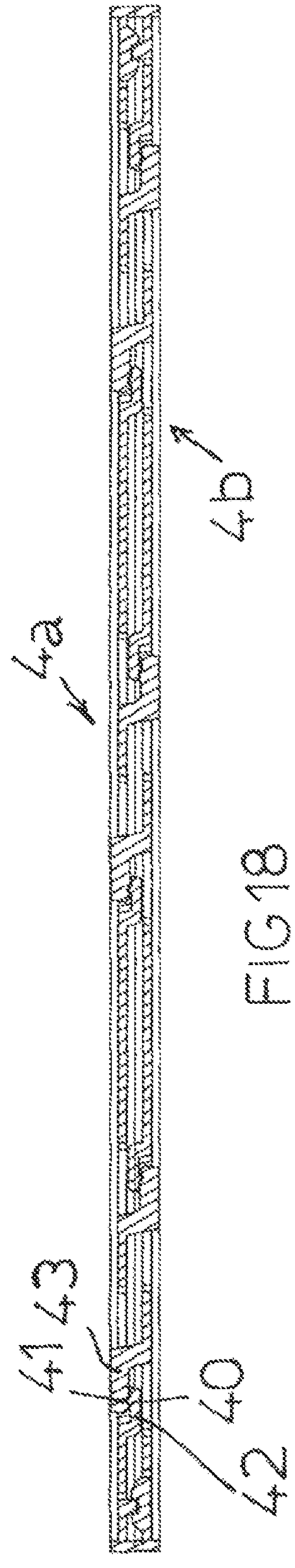


FIG 18

PACKAGE STRUCTURE FOR GLASS CONTAINERS FOR PHARMACEUTICAL USE

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a divisional of application Ser. No. 12/671,671, filed Feb. 1, 2010, U.S. Pat. No. 8,360,238 which is a U.S. national phase application of International Application No. PCT/EP2008/006232, filed Jul. 29, 2008, which claims benefit from Swiss Application No. 1232/07, filed Aug. 2, 2007, all of which are hereby incorporated herein by reference in their entirety.

FIELD

The present invention refers to a package structure for glass containers for pharmaceutical use.

BACKGROUND

Known is a package structure for sterilised syringes comprising a container with closed bottom holding therein a grid having a plurality of accommodation holes wherein arranged with a vertical orientation are the syringes held into position by simply placing their flange at the perimeter edge of the accommodation holes.

The system for holding a package structure for sterilised syringes is ineffective and unsuitable for holding functioning with bottles or similar containers not provided with projecting parts.

Such packaging structure for syringes has a limited flexibility in use in that it is not suitable to be used effectively both for containers different from syringes available in the market and machinery for filling containers different from syringes available in the market, for example glass bottles, carpules and phials for pharmaceutical use.

In particular, it is not possible to insert glass containers for pharmaceutical use into such structure for delivery to the pharmaceutical companies, ready to be filled.

SUMMARY

Therefore, the technical task proposed by the present invention is that providing a package structure for glass containers for pharmaceutical use capable of eliminating the technical drawbacks observed in the prior art.

Within the scope of this technical task an object of the invention is that of providing a package structure for glass containers for pharmaceutical use capable of allowing to hold the containers into a preset position in a stable manner also in order to protect them against accidental breakages and in order to be able to deliver them to the pharmaceutical companies ready for filling.

Another object of the invention is that of providing a package structure for glass containers for pharmaceutical use capable of guaranteeing the sterilisation of the product, maintaining the sterility of the product, maintaining the quality characteristics of the product, proving the integrity of the product, identification and traceability of the product, transfer of the product without jeopardising the aforelisted properties.

Last but not least, an object of the invention is that of providing a package structure for glass containers for pharmaceutical use capable of allowing an easy and quick step for loading glass containers into a process machine for handling thereof, in particular for filling, closure, packaging, etc thereof.

The technical task, as well as these and other objects, according to the present invention are attained by providing a package structure for glass containers for pharmaceutical use according to claim **1**.

Furthermore, other characteristics of the present invention are defined in the subsequent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention shall be dearer from the description of a preferred but not exclusive embodiment of the package structure for glass containers for pharmaceutical use according to the finding, illustrated for indicative and non-limiting purposes in the attached drawings, wherein:

FIG. **1** shows a side elevated exploded view of a package structure for glass containers for pharmaceutical use according to a first preferred embodiment of the invention;

FIG. **2** shows a perspective exploded view of the package structure of FIG. **1**;

FIG. **3** shows a cross-sectional view according to a vertical plane of the package structure of FIG. **1**;

FIG. **4** shows an enlargement of a detail circled in FIG. **3**;

FIG. **5** shows a cross-sectional view according to a vertical plane a package structure for glass containers for pharmaceutical use according to a second preferred embodiment of the invention;

FIG. **6** shows an enlargement of a detail circled in FIG. **5**;

FIGS. **7** and **8** correspond to the embodiment of FIGS. **5** and **6** but with the containers held overturned at a position of 180.degree.;

FIGS. **9** and **10** illustrate possible variants for the external protection casing of one or more trays of a package structure for glass containers for pharmaceutical use according to any one of the embodiments illustrated in the preceding figures;

FIG. **11** shows a perspective view of a package structure for glass containers for pharmaceutical use according to a third preferred embodiment of the invention;

FIG. **12** shows a cross-sectional view according to a vertical plane of the package structure of FIG. **11**;

FIG. **13** shows an enlargement of a detail circled in FIG. **12**;

FIG. **14** shows the various sequential steps for the direct use of a package structure for glass containers for pharmaceutical use in a process machine;

FIG. **15** shows a top plan view of a support plane according to a further preferred embodiment of the invention;

FIG. **16** shows a perspective view of an enlarged detail of the support plane of FIG. **15**;

FIG. **17** shows a view of one of the two parts forming the support plane sectioned along line **17-17** of FIG. **15**; and

FIG. **18** shows a view of the two assembled parts forming the support plane sectioned along line **17-17** of FIG. **15**.

Identical parts in the various embodiments shall be indicated with the same reference number.

DETAILED DESCRIPTION

Referring to the abovementioned figures, a package structure for glass containers for pharmaceutical use is shown indicated in its entirety with reference number **1**.

The package structure **1** comprises a tray **2** accommodating—at an elevated position with respect to its bottom—a support plane **4** having a plurality of holes **12**, spaced with a preset spatial order, for introducing the containers **6**.

The holes **12** have a central symmetry axis S orthogonal with respect to the support plane **4**.

The support plane **4** has—at each hole **12**—special elastically yielding means for holding a container **6** through a holding force radial with respect to the central symmetry axis S.

The holding means extend into the volume enclosed by the projection of the perimeter of the introduction hole **12** in a manner parallel with respect to the central symmetry axis S.

As clear from the description and illustration of the various preferred embodiments of the invention, the holding means can be arranged beneath the support plane **4**, above the support plane **4**, or inside the introduction hole **12** and thus in a manner coplanar with the support plane **4**.

Optionally, as dear from the description and illustration of some preferred embodiments of the invention, the support plane **4** has—at each introduction hole **12**—special support means **5** for nearing the weight of the container **6** also through a support force parallel with respect to the central symmetry axis S.

The introduction holes **12**, which preferably—as shown—are circular-shaped, advantageously have a matrix order arranged in series of rows and columns which facilitates a possible automated movement and handing of the containers **6**.

The tray **2** has a quadrangular bottom **7** raising from which are side walls **8**.

The support plane **4** is supported perimetrally by a support shoulder **9** which develops along the internal surface of the side walls **8** of the tray **2**.

The distance of the support plane **4** from the bottom **7** of the tray **2** must be such to allow accommodating the containers **6** in the holes **12** in such a manner that they are held for their entire length of the space enclosed between the tray **2** and one of its closure covers **10**.

The closure cover **10** is preferably a flexible flat sheet which can be applied for example through ultrasonic fastening against the flattened upper edge **11** of the side walls **8** of the tray **2** in a way to be removed therefrom through simple exfoliation, that is by pulling a special strip of the sheet.

In the preferred embodiment illustrated in FIGS. **1-4** the means for holding the container **6** comprise, for each hole **12**, flaps **13** adapted to elastically fit against the lower diameter of the neck of the container **6**.

In particular, the flaps **13** develop entirely around the introduction hole **12** and above it with a longitudinal development axis having a first axial component radially directed towards the central symmetry axis S and a second axial component directed in a manner parallel with respect to the central symmetry axis S.

In this case, both the centred holding of the container **6** and the support of its weight are ensured only by the elastic flaps **13**.

As a matter of fact, their first axial component generates a force ensuring the centred holding of the container **6** in the introduction hole **12** while their second axial component generates a force operating for supporting the weight of the container **6**.

On the other hand, in the preferred embodiment illustrated in FIGS. **5-8** the means for holding the container **6** comprise, for each hole **12**, at least one rib **14** which develops along a centred circumference on the central symmetry axis S and adapted to elastically fit against the external parameter of the side wall of the container **6**.

In this case, the support means **5** for bearing the container **6** comprise a basket **16** projecting from the support plane **4** beneath the hole **12**, and the rib **14** is provided right along the side surface of the basket **16**.

Thus, the container **6** is arranged in the basket **16** whose base **17** serves as a support for the base (FIGS. **7** and **8**) or for the head (FIGS. **5** and **6**) of the container **6**.

Contrary to the preferred embodiment illustrated in FIGS. **5-8** wherein the support plane **4** is borne in the tray **2**, in the preferred embodiment illustrated in FIGS. **11-13** the tray **2** and the support plane **4** are integrated into a single piece. Alongside implying a more limited number of parts, the latter solution can have a small overall dimension in terms of height and it is suitable especially for use in short containers. Given that the containers **6** are placed at the bottom of the tray **2** the height of the tray **2** must be only slightly greater than the height of the containers **6** in such a manner to be able to hold them entirely therein.

On the other hand, referring to embodiments illustrated in FIGS. **15-18**, the flaps **13** develop inside the introduction hole **12** with a longitudinal development axis radially directed towards the central symmetry axis S.

In this case, the support plane **4** has two flat parts **4***a* and **4***b* formed in a mirror-like manner and mutually fastenable in an overlapped position by means of a bayonet fastening system which develops perimetrally on the support plane **4** and provides for mutual engagement members **42** and **43** respectively, one of which is provided with a snap-tooth **40** couplable into a special snap-seat **41** of the other by means of relative translation sliding between the flat part **4***a* and the flat part **4***b* for example along a translation axis parallel to the greater axis of the support plane **4**.

Preferably, also provided for is a system for locking the flat part **4***a* and the flat part **4***b* in the final configuration of complete overlapping.

The locking system, also provided for perimetrally on the support plane **4** and more precisely at the sides of the support plane **4** orthogonal to the axis of mutual translation between the flat parts **4***a* and **4***b*, comprise at least one hook **46** which can be snap-fitted into an engagement hole **47** preferably accessible only by means of a special tool for the subsequent disengagement of the hook **46**.

The flaps **13** are at least two and they are provided for one on the flat part **4***a* and one on the flat part **4***b* in a manner such to be arranged diametrically in the introduction hole **12** for grasping on the diameter of the neck of the container **6** when the flat part **4***a* and the flat part **4***b* are entirely overlapped.

In this case, the introduction hole **12** has radial protrusions **44** adapted to increase the longitudinal development of the flaps **13** and reduce their portion for attaching against the support plane **4** to increase their elastic flexibility.

In this embodiment of the invention, the means **5** for supporting the container **6** comprise an internal flange **45** of the introduction hole **12** for supporting the base of the head of the container **6**.

The flange **45** extends into the introduction hole **12** for a radial section smaller than the one with which the flaps **13** extend into the introduction hole so as not to interfere with the hole of the container **6**.

The flange **45** is subdivided into at least two portions—one borne by the flat part **4***a* and the other by the flat part **4***b*—in such a manner to be aligned diametrically in the introduction hole **12** when the flat part **4***a* and the flat part **4***b* are entirely overlapped.

The implementation of the forces by the flaps **13** and the flange **45** at diametrically opposite ends of the container **6** allows providing a safe and stable holding in centred position of the container **6**.

The tray **2** advantageously has means **30** for the identification and traceability of the product contained in the container **6**, preferably an identification code of the RFID type.

The package structure **1** is completed by at least one external protection casing **18** which encloses a tray **2** therein, and allows its transfer to an area with a controlled environment (e.g.: an area where the glass containers are filled for pharmaceutical use).

The protection casing **18** can be closed (FIG. **10**) or open and in particular provided with at least one opening **19** for quick transfer (FIG. **9**).

Each protection casing **18** can contain one or more stacked trays **2**.

The protection casing **18** is preferably made up of a bag or a plastic sheet.

Now, referring to FIG. **14** shown is the package structure **1** for directly delivering—in an automatic manner—the containers **6** with a spatially preset position to a process machine **20** for their handling thereof.

The process machine **20** comprises a robotised arm **21** provided with a head **22** for grasping the containers **6**.

The robotised arm **21** has a horizontal translation axis X, a vertical translation axis Y and a rotation axis Z orthogonal to the translation axis X and Y.

The grasping head **22** has an open rectilinear groove **23** for grasping a row of containers **6**.

After being extracted from the external casing **18** and being removed of the cover **10**, the support plane **4** (or the tray **2** if integral with the support plane **4**) is moved towards the grabbing position by the grabbing head **22** wherein the containers **6** are arranged in rows oriented in a manner parallel to the axis X.

In particular, the grabbing head **22** is initially external with respect to the support template **4** and has a groove **23** oriented in a manner parallel to the axis X.

The grabbing head **22** translates along axis X to insert the groove **23** into the neck of the row of containers **6** aligned with the groove **23** itself.

After having engaged the row of containers **6**, the grabbing head **22** translates along axis Y to lift the row of containers **6** engaged detaching it from the support **4**.

Subsequently, the grabbing head **22** translates along axis X to transport the engaged row of containers **6** towards a conveying station **24** at which the grabbing head **22** rotates around axis Z to slide the engaged row of containers **6** towards it.

The package structure for glass containers for pharmaceutical use thus conceived is susceptible to various modifications and variants, all falling within the scope of the invention concept; furthermore, all the details can be replaced by technically equivalent elements.

In practice, all the materials used, alongside the dimensions, may vary depending on the requirements and the state of art.

The invention claimed is:

1. A package structure for glass containers for pharmaceutical use, comprising a tray accommodating, at a raised position with respect to its bottom, a support plane having, for the introduction of said containers, a plurality of introduction holes spaced from each other with a preset spatial order and having a central symmetry axis orthogonal to said support plane, said support plane further holding, at each of said introduction holes, elastically yielding flexible means for holding a container by means of a holding force radial with respect to said central symmetry axis, said support plane having two flat parts mutually fastenable at an overlapped position by means of a bayonet fastening system, said holding means extending into the volume enclosed by a projection of the perimeter of each of said introduction holes in a manner parallel to said central symmetry axis, said means for holding comprising flaps adapted to elastically fit against the lower diameter of the neck of said container, one of the flaps is provided on a first of the two flat parts and another of the flaps is provided on a second of the two flat parts, wherein said two flat parts have an initial staggered configuration for insertion of said container into a respective one of said introduction holes and a final, overlapped configuration lockable with a permanent elastic retaining force exerted by said flaps on said container for retention of said container in said respective one of said introduction holes, and wherein, at said final configuration, said flaps are closer to each other than in said initial configuration and said flaps are arranged diametrically in each of said introduction holes for grasping said container.

2. The package structure for glass containers for pharmaceutical use according to claim **1**, further comprising an internal flange of a respective one of said introduction holes for supporting the base of the head of said container, said flange extending inside said respective one of said introduction holes.

3. The package structure for glass containers for pharmaceutical use according to claim **1**, wherein a first one of said two flat parts of the support plane includes at least one hook and a second one of said two flat parts of the support plane includes at least one engagement hole, said at least one hook configured to be snap-fitted into said at least one engagement hole at least two locations along a perimeter of the support plane.

4. The package structure for glass containers for pharmaceutical use according to claim **3**, wherein a snap-fit arrangement of said at least one hook and said at least one engagement hole determines the permanent elastic retaining force exerted by said flaps on said container when a final configuration of said flat parts is achieved.

* * * * *